U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

TECHNICAL NOTE

Filing Code 9210/1400-451
Date Issued BLM-P-67-118
May, 1970

Bureau of Land Management U.S. DEPARTMENT OF THE INTERIOR

PHOS-CHECK MIXING PLANT

The attached drawings and specifications describe a phos-check mixing plant developed by John Jones of the Burley, Idaho District Office. The plant serves the Burley District needs very well and is now described here for optional use in other field operations.

In addition to the superior speed and efficiency of this unit, the cost of construction is appreciably lower than commercial units. The Pocatello mixing plant cost about $1,000.00 as compared to $5,000.00 for commercial mixing plants.

Besides being used as an air tanker mixing plant, this facility could be constructed at a district fire headquarters and be used to mix phos-chek for ground tankers. Large refill tankers could transport mixed phos-check from fire headquaters to the fire line to refill ground tankers. This mixing plant would also provide good reloading facilities for tankers after a fire.

The only limiting factor for building this mixing plant is an adequate water supply. However, most airports capable of handling retardant aircraft have ample water supply.

Improvements Over Other Mixing Plants:

1. Pumps - Most commercial mixing plants have two pumps; one for mixing and one for loading into the plane. The mixing plant in this suggestion has only one pump that mixes and loads. This adds to the simplicity of the unit and greatly reduces cost.

   In heavy fire load areas where many air tankers are used, a double system should be built. That is, two tanks and two pumps would be constructed so that one unit can mix while the other loads. Operations could continue if mechanical failure occurred in one unit.

2. Hopper Location - On many commercial mixing plants, the phos-chek is placed in the hopper and introduced into the water on the discharge side of the pump. The viscosity of the solution after the phos-chek is introduced is about 1,500 centipose and under an economical pumping head there will be laminar flow within the pipe. This provides very little mixing action.

In the suggested system the phos-chek is introduced on the suction side of the pump and receives benefit of the mixing that takes place within the pump.

3. Adding Water With Phos-chek - In most systems the phos-chek induction pipe between the hopper and the water line becomes caked with damp phoschek and restricts flow. In the suggested mixing plant, water is added through the hopper washing line (M). This washes away any build-up of phos-chek that may occur.

4. Storage and Mixing Tank - Most other mixing systems have a mixing tank and a storage tank. After the phos-chek is mixed in one tank it is pumped into another tank before it can be loaded into the retardant aircraft.

   This system eliminates the mixing tank as only one tank is needed for mixing and storage. This adds to the simplicity of the system, eliminates one pump, one tank and reduces cost.

   Such items as motor h.p., pipe and valve size or tank capacities are not specified here since these items will vary according to the work load that is required of the system.

Operation and Suggested Hardware - (Refer to attached Isometric drawing)

In order to initially charge the system:

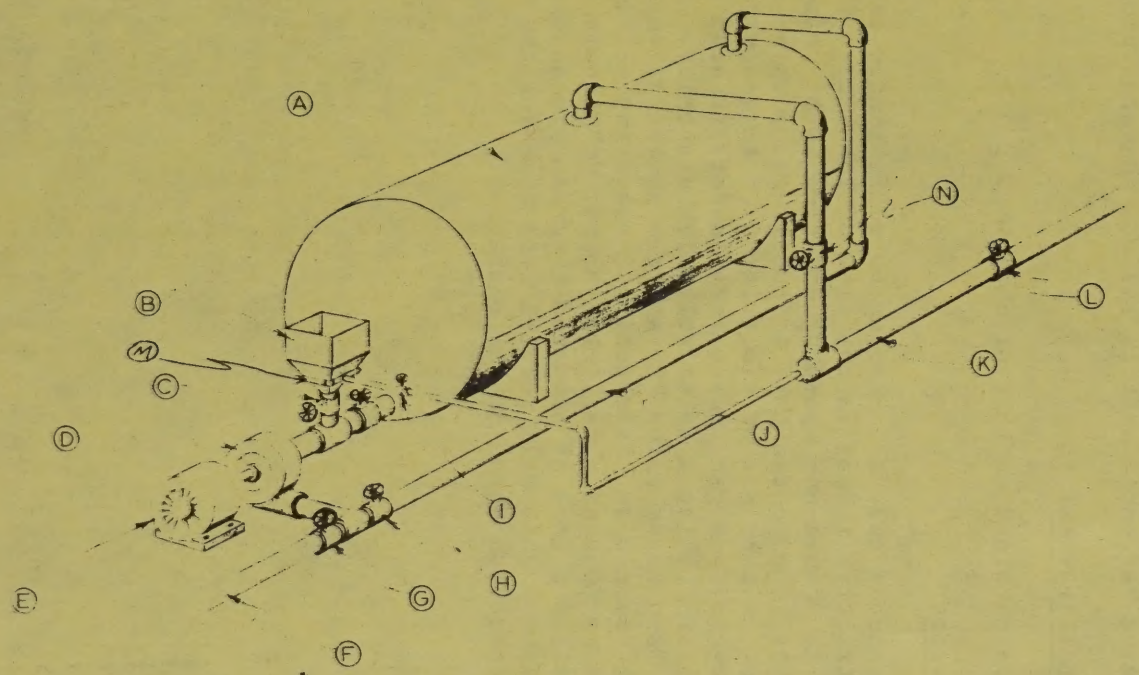
Step 1. Open Stop-Waste Valve "L" in water source line "K".

Step 2. Open Primary Fill Value "N" and allow Storage Tank "A" to become 1/4 to 1/3 filled. Make sure Charging Valve "C" and fill Valve "G" are closed.

Step 3. Open Circulation Valve "H" and valve at end of tank (not numbered).

Step 4. Start Pump "D" and allow to operate until circulation of water has begun.

Step 5. Place powdered retardant in Hopper "B", open Charging Valve "C" and then open Secondary Fill Valve "I" into Hopper "B" where it is discharged downward through 4 jets. This assists in the introduction of the powdered retardant into flow of water from the tank to the pump.



SYMBOLS

A. STORAGE TANK
B. HOPPER
C. CHARGING VALVE
D. CENTRIFUGAL PUMP
E. POWER SOURCE
F. LOADING LINE
G. LOAD VALVE
H. MIX VALVE
I. SECONDARY FILL VALVE
J. CIRCULATION LINE
K. WATER SOURCE
L. STOP-WASTE VALVE
N. PRIMARY FILL VALVE

M Hopper Washing Line

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SLURRY MIXING PLANT

Burley District, Idaho

DESIGNED JJ	RECOMM.
DRAWN JLM	RECOMM. CHIEF DIV. OF ENG.
CHECKED	APPROVED
SCALE none	
DATE 3/15/67	SHEET 1 OF
DRAWING NO.	

GPO 853-860

Step 6. When predetermined amount of powdered retardant has been introduced, shut off secondary Fill Valve "I" and then shut off Charging Valve "C". Open valve ahead of the Hopper ("B") and at end of tank.

Step 7. When Storage Tank "A" is full, shut off Primary Fill Valve "N" and allow slurry to circulate until thoroughly mixed. (NOTE: Retardant will not remain in suspension indefinitely. Circulate mixture occasionally to maintain the desired viscosity of the slurry.)

In order to load waiting aircraft or pumper units:

Step 1. With slurry circulating, place end of Load Line "F" into waiting unit. Open Load Valve "G" and close Mix Valve "H" until unit is filled. Reverse procedure.

In order to refill system:

Repeat steps outlined in initial charging.

Suggested Hardware:

It is recommended that all plumbing be sufficiently large to reduce restrictive forces in the flow of the slurry as much as possible. As volume and speed of operation is of prime importance, it is further recommended that a centrifugal pump be installed. A pump motor, either gas or electric, with an adequate horse power rating (plus a generous safety factor) is also advised to move a solution having a relatively high viscosity. All valves, except the Stop Waste Valve "L" and the outlet valve at the end of the tank, should be "fast acting", requiring not more than 90^{o} of turn to open or close. The Hopper "B" should be large enough to allow a sack of powdered retardant to be dropped on cutting knives. This will require less time for the completion of the introduction stage of the operation.